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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/652,326	08/29/2003	Anand A. Kekre	VRT0098US	1638
60429 7590 02/05/2008 CAMPBELL STEPHENSON LLP 11401 CENTURY OAKS TERRACE BLDG. H, SUITE 250 AUSTIN, TX 78758			EXAMINER PHAM, KHANH B	
			ART UNIT 2166	PAPER NUMBER
			MAIL DATE 02/05/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/652,326

Applicant(s)

KEKRE, ANAND A.

Examiner

Khanh B. Pham

Art Unit

2166

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5-8,10,12-15,17,19-21 and 26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,5-8,10,12-15,17,19-21 and 26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 29, 2007 has been entered. Claim 26 has been added. Claims 1, 3, 5-8, 10, 12-15, 17, 19-21 and 26 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims **1, 3, 5-8, 10, 12-15, 17, 19-21, and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Federwisch (US 6,889,228 B1), and in view of Patterson et al. ("SnapMirror: File-System-Based Asynchronous Mirroring for Disaster Recovery"), hereinafter referred to as "**Federwisch**" and "**Patterson**" respectively.

As per claims 1, 8, and 15, Federwisch teaches a method, apparatus and medium for performing cascaded replication (See Fig. 2) comprising:

- “asynchronously replicating data to be written to a data volume of a first node to a data volume of a second node” at Col. 6 lines 15-55 and Fig. 2;
- “replicating data to be written to said data volume of said second node to a data volume of a third node, wherein said replicating data to be written to said data volume of said second node comprises periodically replicating, at a first frequency, said data to be written to said data volume of said second node to said data volume of said third node” at Col. 6 lines 15-55 and Fig. 2;
- “replicating data to be written to said data volume of said third node to a data volume of a fourth node, wherein said replicating data to be written to said data volume of said third node comprises periodically replicating, at a second frequency, said data to be written to said data volume of said third node to said data volume of said fourth node” at Col. 6 lines 15-55 and Fig. 2;

Federwisch employs SNAPMIRROR software to perform cascaded replication, but does not explicitly teach that “said first frequency is higher than said second frequency.” Patterson teaches a method for achieving the right balance between potential data loss and costs of maintaining a replica in SNAPMIRROR, by adjusting update frequency. Patterson teaches at page 2, Col.1, 1st paragraph that: “Users set the update frequency. If the update frequency is high, the mirror will be nearly current with the source and very little data will be lost when disaster strikes. But, by lowering the

update frequency, data managers can reduce the performance and network cost of maintaining the mirror at the risk of increased data lost".

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement Federwisch's method using two different update frequencies as suggested by Patterson: the first frequency is higher to reduce data loss and the second frequency is lower to reduce network cost and improve performance of the system.

As per claims 3, 10, and 17, Federwisch teaches a method of performing cascaded replication comprising:

- "asynchronously replicating data to be written to a data volume of a first node to a data volume of a second node" at Col. 6 lines 15-55 and Fig. 2;
- "replicating data to be written to said data volume of said second node to a data volume of a third node, wherein said replicating data to be written to said data volume of said second node comprises asynchronously replicating said data to be written to said data volume of said second node to said data volume of said third node" at Col. 6 lines 15-55 and Fig. 2;
- "replicating data to be written to said data volume of said third node to a data volume of a fourth node, wherein said replicating data to be written to said data volume of said third node comprises periodically replicating, a first frequency,

said data to be written to said data volume of said third node to said data volume of said fourth node" at Col. 6 lines 15-55 and Fig. 2;

- "replicating data to be written to said volume of said fourth node to data volume of a fifth node, wherein said replicating data to be written to said data volume of said fourth node comprises periodically replicating, at a second frequency, said data to be written to said data volume of said fourth node to said data volume of said fifth node" at Col. 6 lines 15-55 and Fig. 2;

Federwisch employs SNAPMIRROR software to perform cascaded replication, but does not explicitly teach that "said first frequency is higher than said second frequency." Patterson teaches a method for achieving the right balance between potential data loss and costs of maintaining a replica in SNAPMIRROR, by adjusting update frequency. Patterson teaches at page 2, Col.1, 1st paragraph that: "Users set the update frequency. If the update frequency is high, the mirror will be nearly current with the source and very little data will be lost when disaster strikes. But, by lowering the update frequency, data managers can reduce the performance and network cost of maintaining the mirror at the risk of increased data lost".

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement Federwisch's method using two different update frequencies as suggested by Patterson: the first frequency is higher to reduce data loss

and the second frequency is lower to reduce network cost and improve performance of the system.

As per claims 5, 12, and 19, Federwisch and Patterson teach the method, apparatus and mediums of claims 3, 10, 17 discussed above. Federwisch also teaches: "wherein said asynchronously replicating data to be written to said data volume of said first node comprises, asynchronously replicating data to be written to a data volume of a primary node to a data volume of an intermediate node; and said asynchronously replicating data to be written to said data volume of said second node comprises, asynchronously replicating data to be written to said data volume of said intermediate node to a data volume of a secondary node" at Col. 6 lines 15-55 and Fig. 2.

As per claims 6, 13, 20, Federwisch and Patterson teach the method, apparatus and mediums of claims 5, 12, 19 as discussed above. Federwisch also teaches: "wherein said asynchronously replicating data to be written to said data volume of said intermediate node comprises asynchronously replicating data to be written to said data volume of said intermediate node to a data volume of each of a plurality of secondary nodes" at Col. 7 lines 48-60 and Figs. 4.

As per claims 7, 14, and 21, Federwisch and Patterson teach the method, apparatus and mediums of claims 3, 10, 17 as discussed above. Federwisch also teaches:

- "said asynchronously replicating data to be written to said data volume of said first node comprises asynchronously replicating data to be written to said data volume of said first node to said data volume of said second node using a first data link coupled between said first node and said second node" at Col. 6 lines 15-55 and Fig. 2;
- "said asynchronously replicating data to be written to said data volume of said second node comprises asynchronously replicating data to be written to said data volume of said second node to said data volume of said third node using a second data link coupled between said second node and said third node" at Col. 6 lines 15-55 and Fig. 2;
- "and said first data link has a higher bandwidth than said second data link" at Col. 7 lines 48-60 and Fig. 4.

4. **Claim 26** is rejected under 35 U.S.C. 103(a) as being unpatentable over Federwisch and Patterson as applied to claims 1, 3, 5-8, 10, 12-15, 17, 19-21 above, and further in view of Teloh et al. (US 2003/0014432 A1), hereinafter "Teloh".

As per claim 26, Federwisch and Patterson teach the method of claim 1 discussed above. Federwisch and Patterson do not explicitly teach: "writing the data to be written to the data volume of the first node to a replication log before asynchronously replicating the data to the data volume of the first node to the data volume of the second node." However, Teloh teaches a similar replication method including the step of method of

claim 1 discussed above. Federwisch and Patterson do not explicitly teach: "writing the data to be written to the data volume of the first node to a replication log before asynchronously replicating the data to the data volume of the first node to the data volume of the second node" at [0057] and Fig. 8. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Teloh with Federwisch and Patterson's system in order to "ensure the data on the remote storage device matches the data on the local storage device" as suggested by Teloh at [0057].

Response to Arguments

5. Applicant's arguments filed October 29 have been fully considered but they are not persuasive. The examiner respectfully traverses applicant's arguments.

6. Applicant argued that Federwisch and Patterson do not teach that the mirror contained in a first pair of blocks are the result of **asynchronous** replication while the mirrors contained in a second pair of blocks are the result of **periodic** replication. On the contrary, Patterson teaches at the last paragraph of Col. 2, page 1 that SnapMirror is "a technology which implement **asynchronous** mirror" and "SnapMirror **periodically** transfer self-consistent snapshots of the data". Therefore, Federwisch's system is both asynchronous and periodical replication.

7. Applicant further argued that Patterson does not teach "a first update frequency between a first pair of data volumes and a second frequency between a second pair of data volume" and "one frequency is higher than the other". On the contrary, Patterson

teaches at page 2, Col. 1 that replication frequencies are not fixed but can be adjusted. Patterson therefore suggests using different frequency between each pair of data volumes to optimize performance and reduce network cost.

In light of the foregoing arguments, the 35 U.S.C 102 rejection is hereby sustained.

Conclusion

Examiner's Note: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

The prior art made of record, listed on form PTO-892, and not relied upon, if any, is considered pertinent to applicant's disclosure.

If a reference indicated as being mailed on PTO-FORM 892 has not been enclosed in this action, please contact Lisa Craney whose telephone number is **(571) 272-3574** for faster service.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh B. Pham whose telephone number is (571) 272-4116. The examiner can normally be reached on Monday through Friday 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hosain Alam can be reached on (571) 272-3978. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Khanh B. Pham
Primary Examiner
Art Unit 2166

January 31, 2008

